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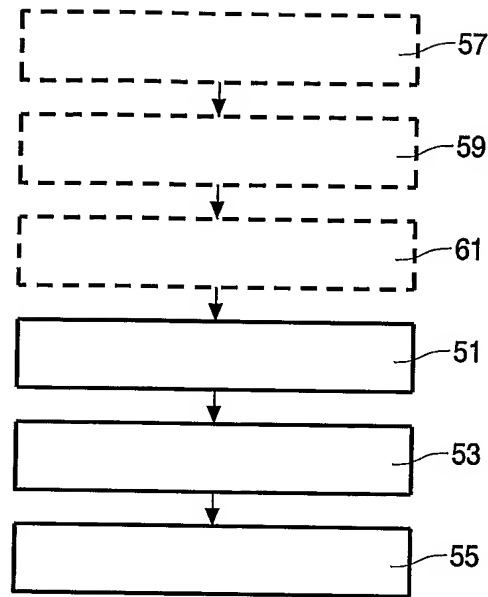


FIG. 1

```

<!DOCTYPE payInfo [
  <!ELEMENT payInfo (creditCard?, amount+)>
  <!ELEMENT creditCard (number, name, address)>
  <!ATTLIST creditCard limit CDATA #IMPLIED>
  <!ELEMENT number (#PCDATA)>
  <!ELEMENT name (#PCDATA)>
  <!ELEMENT address (#PCDATA)>
  <!ELEMENT amount (#PCDATA)>
]>

```

FIG. 2a

An XML DTD example-dtd1

```

<pay_Info>
  <creditCard limit=1000>
    <number> 123456789 </number>
    <name> Alice </name>
    <address> Twente 7500 AE, Netherlands </address>
  </creditCard>
  <amount 100.0 </amount>
</pay_Info>

```

FIG. 2b

An XML document example-doc1 that conforms to dtd1

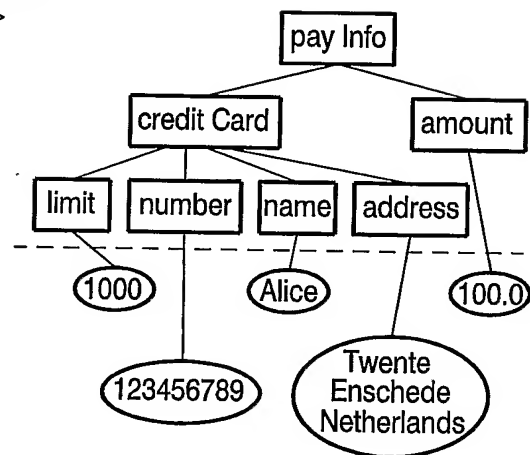


FIG. 2c

A graphical representation of the DOM tree structure for dtd 1 and doc 1

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Path Length	Path
2	$P_1 = (\text{payInfo/creditCard/limit})$ $P_2 = (\text{payInfo/creditCard/number})$ $P_3 = (\text{payInfo/creditCard/name})$ $P_4 = (\text{payInfo/creditCard/address})$
1	$P_5 = (\text{payInfo/creditCard})$ $P_6 = (\text{payInfo/amount})$ $P_7 = (\text{creditCard/limit})$ $P_8 = (\text{creditCard/number})$ $P_9 = (\text{creditCard/name})$ $P_{10} = (\text{creditCard/address})$
0	$P_{11} = (\text{payInfo})$ $P_{12} = (\text{creditCard})$ $P_{13} = (\text{amount})$ $P_{14} = (\text{limit})$ $P_{15} = (\text{number})$ $P_{16} = (\text{name})$ $P_{17} = (\text{address})$

FIG. 3

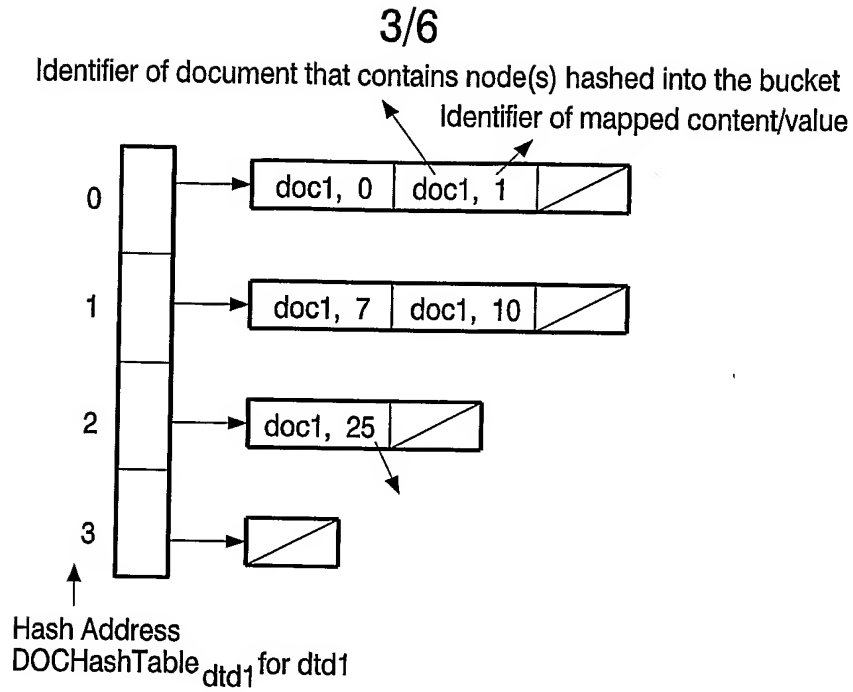


FIG. 4

(Element/Attribute c_{name} , Content/Value c_{val})	HashFunc(c_{name})	MapFunc(c_{val})
$c_1 = (\text{limit}, 1000)$	0	1
$c_2 = (\text{number}, 123456789)$	1	10
$c_3 = (\text{name}, \text{"Alice"})$	0	0
$c_4 = (\text{address}, \text{"Twente, Enschede, Netherlands"})$	2	25
$c_5 = (\text{amount}, 100.0)$	1	7

FIG. 5

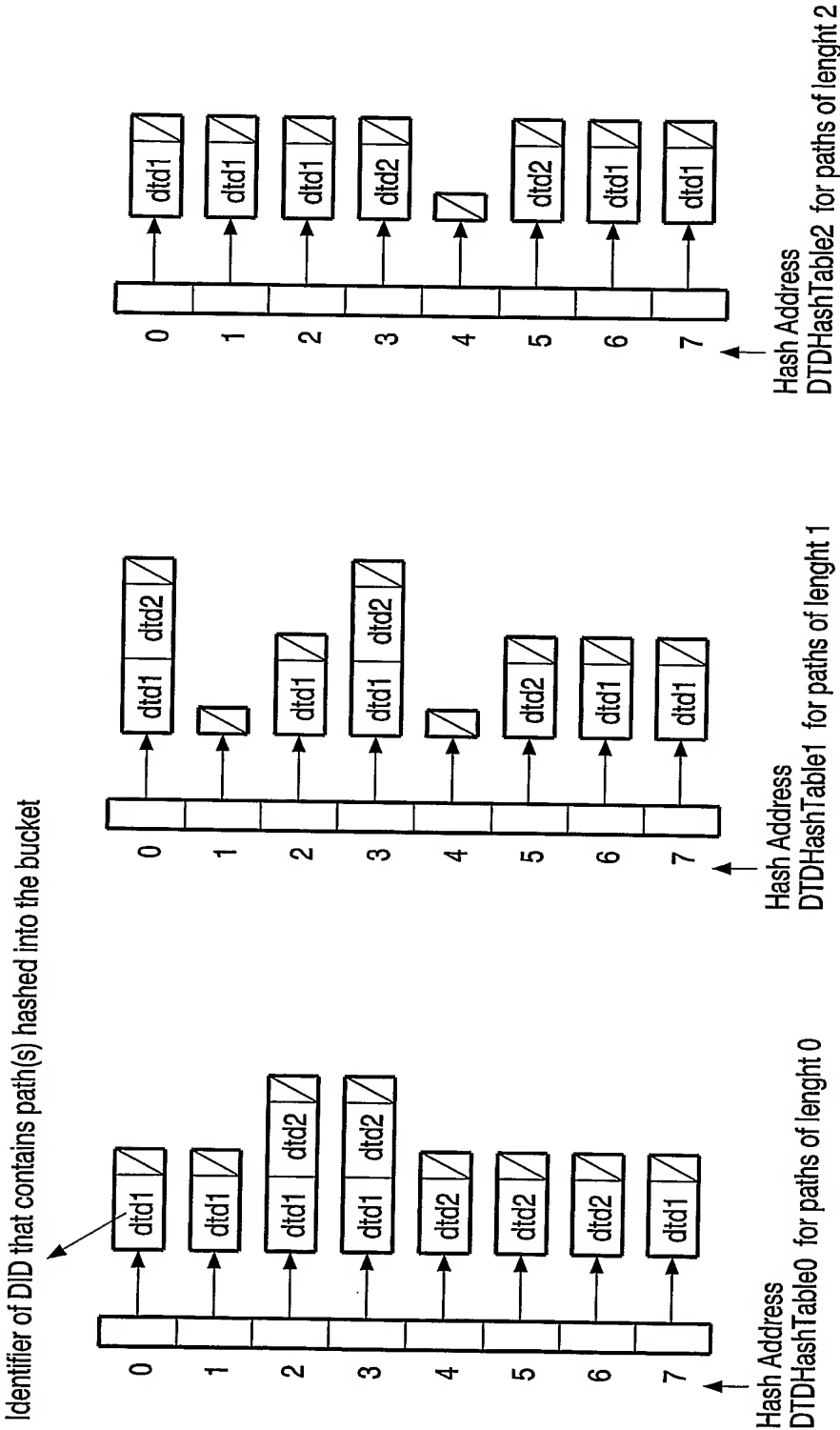


FIG. 6

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```

<!DOCTYPE payInfo [
  <!ELEMENT order (person, invoice)>
  <!ELEMENT person (name, gender)>
  <!ELEMENT name (#PCDATA)>
  <!ELEMENT gender (#PCDATA)>
  <!ELEMENT invoice (dueDate)>
  <!ELEMENT dueDate (#PCDATA)>
]>

```

FIG. 7a

Another DTD example-dtd2

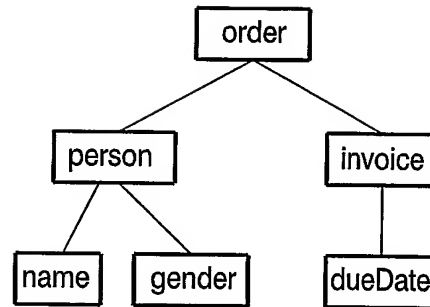


FIG. 7b

A tree structure for dtd2

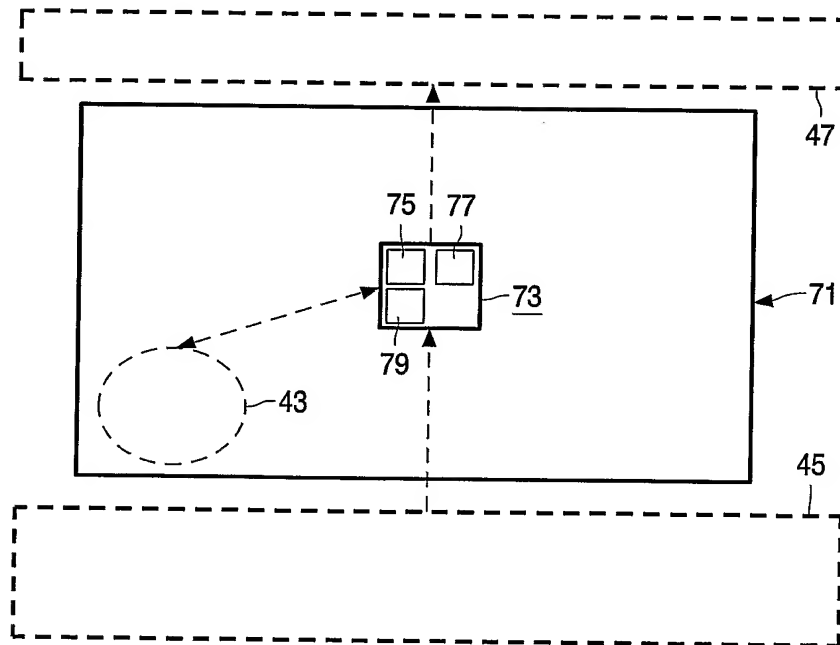


FIG. 8

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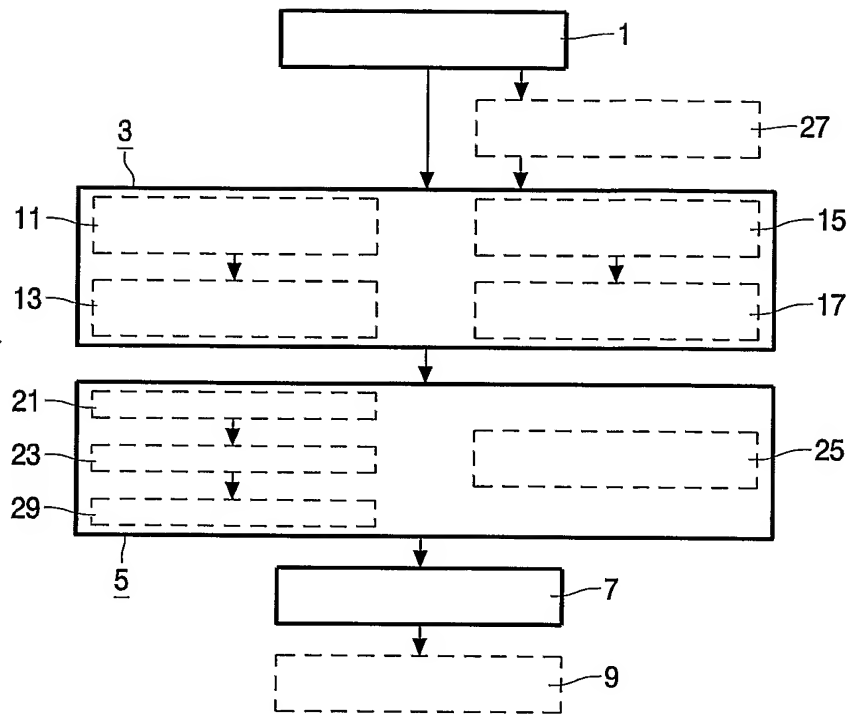


FIG. 9

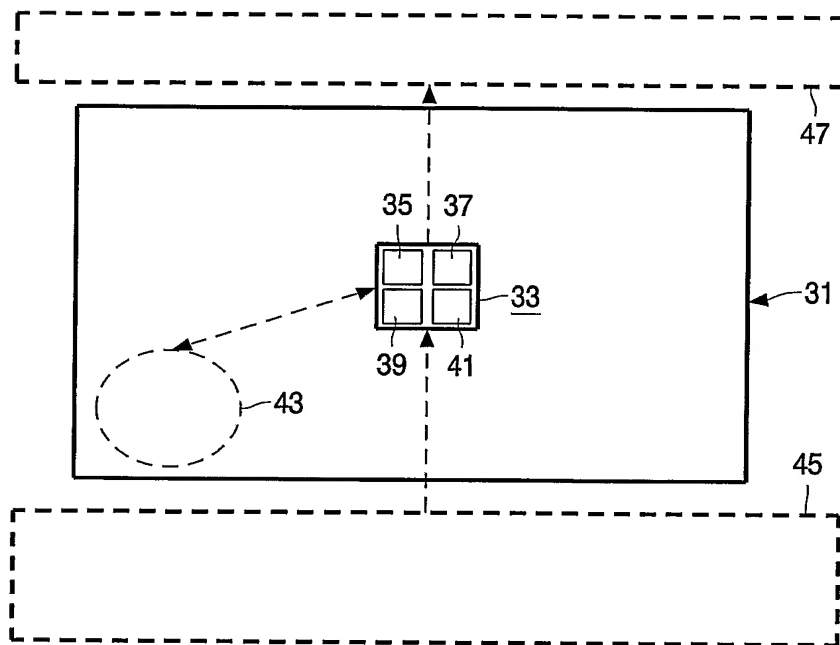


FIG. 10